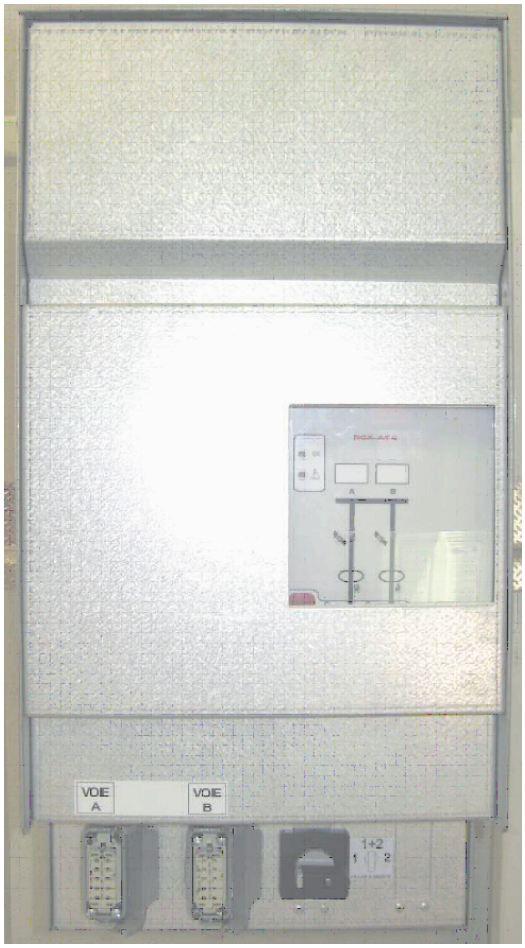
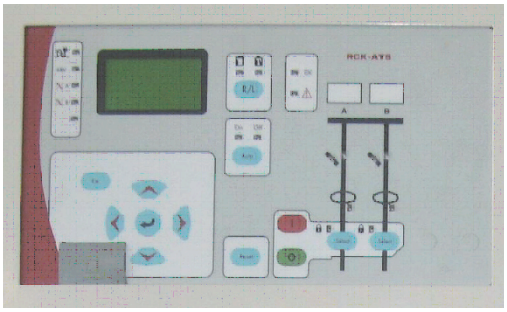
Medium Voltage Distribution

RCX-ATS

Automatic Transfer Switch-over unit vertical & horizontal RCX-ATS

User Guide 6.0





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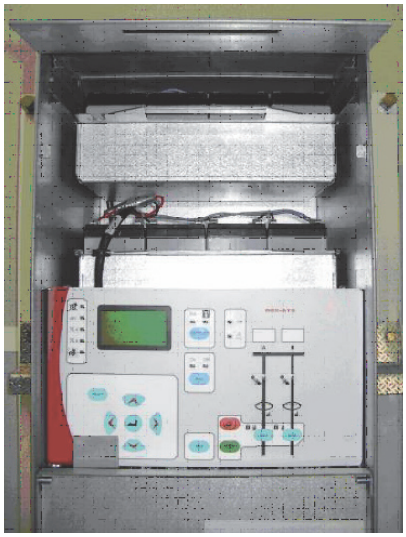
Introduction

This User Manual covers the following versions of the RCX-ATS cabinet as manufactured by Schneider Electric:

- The vertical RCX-ATS cabinet, used for MV underground networks and designed for MV distribution switchboards.



- The horizontal RCX-ATS cabinet, integrated into the upper section of a watertight switchgear unit.

The RCX-ATS cabinet provides an interface between the two MV load-break switch FUs and their automatic relay controls.

Cabinet functions

The RCX-ATS cabinet allows to:

- Switching between power supplies using the Source Switchover function
- Controlling the load-break switches locally via the push buttons
- Setting up the cabinet itself
- Carrying out maintenance tests

Automation

Source Switch-over

The Source Switch-over function is used when the supplies to a sub-station come from two MV cables (Source A & Source B). Under normal operating conditions the sub-station is supplied from just one of these sources. If there is a loss of voltage from this source, the Source Switchover function can switch the sub-station supply to the second MV cable if all switchover conditions have been fulfilled.

Presentation of the Cabinet

Cabinet components

The RCX-ATS cabinet comprises:

- MV fault detection and warning
- MV voltage detection from the Functional Units' Capacitive Dividers
- Energy unit, including batteries and charger
- The interface for the load-break switch control mechanisms
- Automation functions (i.e.: Source Switch-over).

RCX-ATS cabinet – mechanical compartments

- Upper compartment, containing:
  - 4 x 12 V (7Ah) pre-cabled batteries in a pack, to ensure that the cabinet works correctly in case of a loss of the auxiliary supply.
- Central compartment, with the cabinet's Electronic Control Unit
- Lower compartment, containing:
  - The power supply unit with the fuse holder and the Safety Transformer
  - The cabling zone, with cable glands and connectors to electrical controls

RCX-ATS horizontal cabinet – mechanical compartments

- Right hand side compartment, containing:
  - The cabinet's electronic control unit
  - The cable zone with cable glands
- Left hand side compartment, containing:
  - 4 x 12 V (7Ah) pre-cabled batteries in a pack, to ensure that the cabinet works correctly in case of a loss of the auxiliary supply.
  - The power supply unit with the fuse holder and the Safety Transformer
  - Cabling zone with connectors to electrical controls

The Electronic Control Unit includes the following functions:

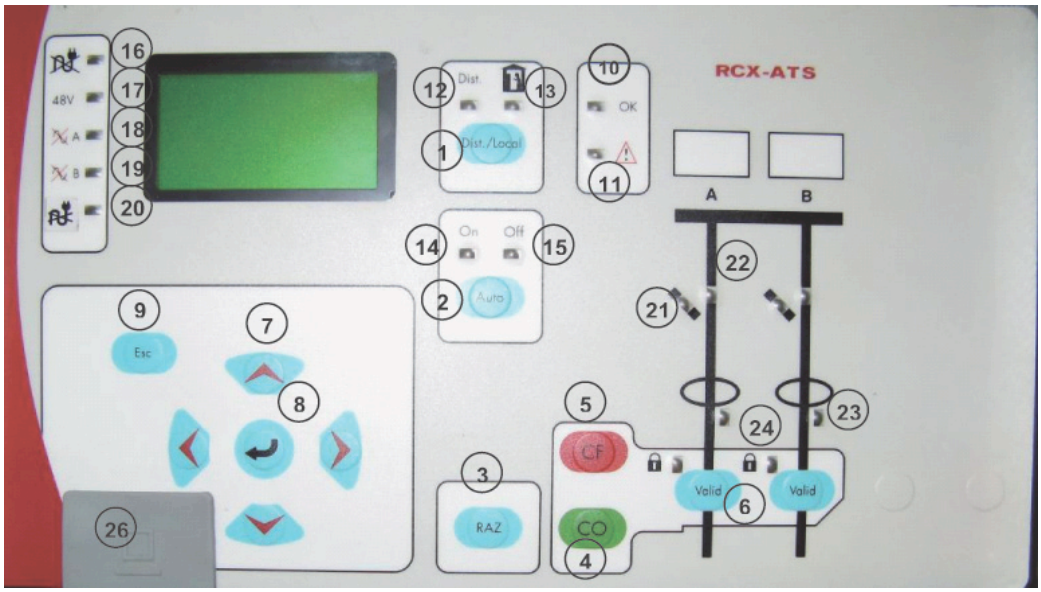
- Central Unit
  - Provides a user-friendly Man-Machine Interface making it possible to customize the cabinet
  - Ensure saving of the cabinet settings
  - Includes the Source Switch-over function
- Power Supply powers the whole cabinet from the main supply or from the battery backup source.
- 2 command interfaces for electrical controls
- 2 ammetric fault detectors

Man-Machine interface

The RCX-ATS cabinet has an enhanced, user-friendly, MMI which comprises a display, push buttons and LEDs.

The display is a backlit LCD unit, with a 4 lines x 20 characters display. It remains off when operating temperatures are below -20°C or above +70°C

Presentation of the Cabinet
(contd.)



Description of buttons and LEDs

	No	Label (French)	Label (English)	Description	
General buttons	1	Dist./Local	Remote/Local	Remote/Local mode: Changeover from remote to local (or the reverse). In Remote mode the MMI buttons are inactive. In Local mode the MMI buttons are active.	L/R
	2	Auto	Auto	Automation: Enable/Disable automatic switch over fonction	L
	3	RAZ	Reset	Switch-off the external light Reset 48V protection fuse on 48V CT output Restart cabinet after 8 hours without Alternative power supply	L/R
	4	CO	Open	Open order: opens the selected electrical control (in conjunction with the EU Validate button)	L
	5	CE	Close	Close order: closes the selected electrical control (in conjunction with the EU Validate button)	L
	6	Valid	Validate	Selection of EU to open or close (in conjunction with OPEN/CLOSE)	L
Navigation controls	7	◄, ►, ▲, ▼		Navigation through menus and scroll through parameter values	L
	8	↵		Validation of an action or selection	L
	9	Esc		Cancel and action or return to previous menu	L
Information displayed	10	OK	OK	Equipment in standby mode: cabinet available (with periodic shutdown)	L/R
	11	! in a red triangle		Equipment faulty: Cabinet unavailable (See Chapter 8)	L/R
	12	Dist.	Remote	Equipment in Remote: cabinet operating in remote mode	R
	13	Local	Local	Equipment in Local: cabinet operating in local mode	L
	14	En service	Operating	Automation running: The Source Selection function is running	L
	15	Hors service	Non-operational	Automation non-operational: The Source Selection function is not running	L
	16	~ barred		Absence of auxiliary power supply (1): No mains voltage (1)	L
	17	48V		48V supply available	L
	18	~ barred A		Absence of MV on EU A supply	L
	19	~ barred B		Absence of MV on EU B supply	L
	20	~ barred		Absence of auxiliary power supply (2): No mains voltage (2) (Redundant option)	L
	21	Green rectangle associated with load-break switch position		Load-break switch OPEN	L/R
	22	Red rectangle associated with load-break switch position		Load-break switch CLOSED	L/R
	23	Red rectangle associated with a symbol representing a torus (core)		Ammetric fault current flow	L/R
	24	Padlock symbol		Electrical control neutralised	L

Presentation of the Cabinet
(contd.)

Access levels

There are three levels, used to define the possibilities for access to the cabinet:
- Level 0: Free access
- Level 1: Access for users
- Level 2: Access for maintenance

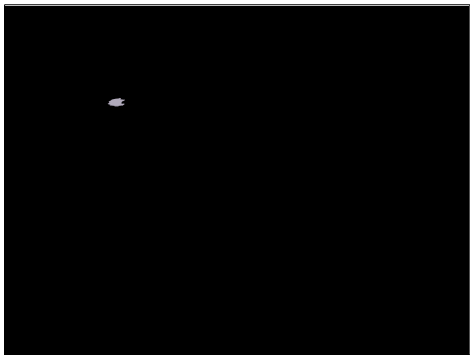
Level 0

Level 0 corresponds to normal operating conditions: all cabinet doors are closed and may be locked using padlocks.

The operator can:

View:
- MV network faults
- The status of the load-break switches
- The status of the cabinet (standby or faulty equipment)

- Access the electrical control connectors



Level 1

Level 1 access is designed for MV network responsible operators :
- The main door is open, the two lower and upper doors are closed (Vertical RCX-ATS).

Presentation of the Cabinet
(contd.)

- The right hand door is open and the left hand door is closed (Horizontal RCX-ATS).

The user can change the operating mode: Local or Remote. In Local mode the following actions are authorised:

- Operating the MV load-break switches,
- Starting or stopping the automation functions,
- Viewing of all light indicators,
- Activation of the RESET button,
- Basic configuration using the navigation buttons.

Level 2

Level 2 is reserved to people in charge of installation and maintenance: All doors are open, and, on the Horizontal RCX-ATS the cover is removed.

In addition to the access granted for Level 1, the user can:

- Access the fuse disconnector to turn on or off the Power Supply.
- Change the batteries,
- Intervene on all cabinet components: Fuses, electronic control unit, connections,
- Access the advanced configuration functions using the navigation buttons.

External indicators

External indicator light 1

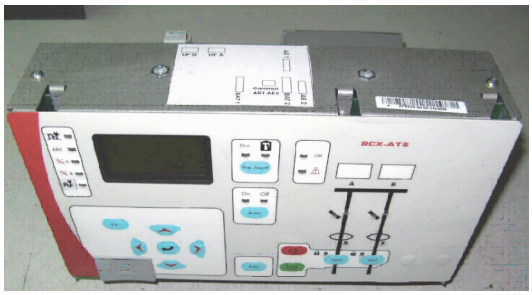
Fitted on the outside of the cabinet, the red indicator light signals that at least one of the FUs has detected the flow of a over current fault current (MV Fault).

In addition, the user can change the configuration to group several anomalies, thus, the general purpose indicator light can be used to indicate: MV fault + faulty equipment.

External indicator light 2

The operator can choose from between 17 sources of information that can be used to light the indicator, thus, the general purpose indicator can show, for example: Source selection active + 230V absent.

Operating modes



There are two operating modes for the RCX-ATS cabinet:

- Remote
- Local

Remote mode

In Remote mode, the cabinet is autonomous.

The on-site operator can only observe the cabinet status using the following indicator lights:

- Equipment Standby
- Faulty equipment
- Fault current flow
- External indicator lights.

All other LEDs information are turned off.

The display remains off.

Local mode

The cabinet can only be changed to local mode by an operator physically in front of the cabinet (Press the LOCAL button).

In Local mode the remote command to turn on or off the automation is disabled.

The operator can control the load-break switches locally, turn on or off the Source Selection function, check the configuration of the cabinet and the operational data, configure cabinet operations, run internal tests, etc.

The operator can switch the cabinet to Remote Mode from any Local Mode menu, by pressing the Local/Remote button.

The LCD contrast can be adjusted using the ◄ and ► buttons.

Local control

The operator, from any local mode menus, can open or close a FU by simultaneously pressing the CO (or CE) button and the VALID button, corresponding to the FU to be manipulated.

The open/close order will only be transmitted to the EU if all of the following conditions have been met:

- The command is contrary to the current position of the EU
- The batteries are capable of executing such a command
- The FU is capable of executing such a command
- Control has not been neutralized (no cabling faults)
- No Open/Close command already underway.

Local operations

The main menu in Local Mode includes the following options:

- **Consultation:**

Display product information (faulty equipment, meters, measurements),

- **Test Reset:**

Used to carry out a test of the indicator (lights, fault detectors) and reset the counters to zero.

- **Standard Settings:**

Modify the basic configuration of the RCX-ATS.

- **Configuration:**

Access to various additional parameters (timing delays, assignment of indicator lights and remote commands, languages, etc.).

Operational rules for menus

The menus are organized hierarchically (See Organizational Flowchart).
The menu options, each identified by a title, are listed vertically down the display screen.
The ▲and▼ buttons are used to browse through the options. The □ button validates the selection and triggers the action proposed. The **ESC** button cancels the action underway and returns to the previous screen display.

Consultation menu

By selecting and validating the **Consultation** menu, the operator goes in a menu allowing him to check product information.
The information displayed is listed, in detail, in the organizational flowchart.

Test reset menu

By selecting and validating the **Test Reset** menu, the operator goes in a menu allowing him to test the lights and detectors.

- **Lamp Light Test:** Used to test all the leds
- **Detector Test:** Select and test one of the fault detectors.

Note: The batteries are tested cyclically. If a battery fault is detected the Faulty Equipment LED lights up and the 48V Present LED goes out.

Lamp Test
During the lamp test all LEDs are on.
The test is stopped either by pressing the ESC button or by waiting one minute.

Detector Test
The Detector Test needs an AFD to be selected.
The test is stopped either by pressing the **ESC** button or by waiting one minute.

Testing the ammetric fault detector is a normal part of the processing of an ammetric fault.

Standard settings menu

By selecting the **STD Setting** menu, the operator enters a menu showing him, and allowing him to modify, the standard cabinet operating parameters.
The modifiable parameters are listed, in detail, in the organizational flowchart.

Operational rules for the setting of parameters

Within the parameter menu, the parameters are listed vertically down the screen.

For each parameter the display shows a single line with the description title and the current value.

The▲ and ▼buttons are used to browse through the parameters. The □ button is used to select a parameter to modify. Its current value will appear on the line below.

The ◄ and ► buttons are used to browse through the available values. The □ button is used to select the new value.

The **ESC** button cancels the action underway and returns to the previous screen display.

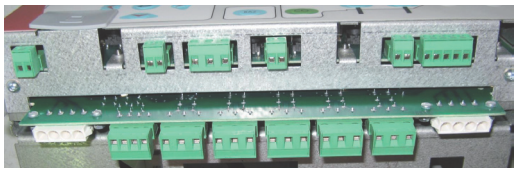
Validation of Modifications

To validate the modification of one or more parameters, the operator must use the **ESC** button to return to the main menu. When changing view from the current menu to the main menu, the message Backup is displayed and the parameters are saved.

Settings menu

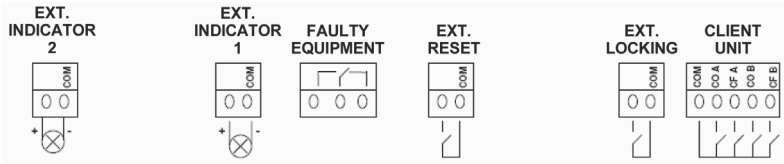
By validating the Settings option the operator brings up a menu used to modify additional parameters (timing delays, assignment of LEDs and Remote Signals, Languages, etc.)
The information displayed is listed, in detail, in the organizational flowchart

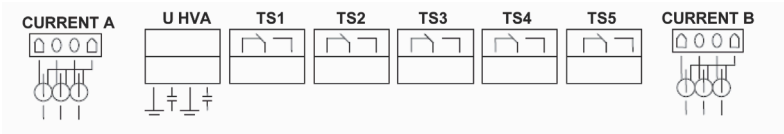
Inputs & Outputs



The RCX-ATS cabinet is fitted with:

- **Reset Ext.:** An input used to acknowledge faults using a dry contact.
- **Ext. locking:** An input used to lock the automation using a dry contact.
- **Client Unit:** An input used to connect a unit (supplied as an option) used to transmit commands to the FUs.
- **Ext. Indicator Light 1 & 2** An output used to provide power to an external indicator light used to warn of various types of fault (assignment possible via MMI).
- **TS 1 to 7:** (C/NO/NC dry contact) output: used to transmit various types of data (assignment is possible via MMI).
- **Faulty Equipment:** (C/NO/NC) dry contact: used to provide data on the state of the RCX-ATS.





Comments

Resets with the Source Selection automation

When the Source Selection automation system is running, the fault detectors are reset to standby if the following conditions are fulfilled:

- For Line A: RPTI-type ‘MV Present‘ data transmitted by both FU A & B simultaneously.
- For Line B: RPTI-type ‘MV Present‘ data transmitted by both FU A & B simultaneously

Faulty equipment

If the “Faulty Equipment“ LED is on (! In a red triangle), there is a fault on the equipment and the cabinet is not fully available.

In this case, the Consultation/Faulty Equipment menu can be used to list the problems.

The following table lists all causes of faulty equipment and the recommended methods to be used in resolving these problems.

Faulty Equipment Table

Test displayed	Description and recommendations
Flt Charge Ae1	Charger 1 is faulty: ■ Disconnect and reconnect the cabinet ■ If the problem remains, contact your supplier
Flt Charge Ae2	Charger 2 is faulty: ■ Disconnect and reconnect the cabinet ■ If the problem remains, contact your supplier
Flt Rmt Fuse	At least one battery is connected to an open circuit: ■ Check the condition of the two battery cable fuses ■ Check all connections between batteries and the power supply board ■ Change the batteries
Battery Low	The batteries need to be replaced or recharged, load break switches can no longer be manoeuvred: ■ Immediately charge the batteries ■ Immediately change the batteries
Ram Corrupt	The non-volatile system FRAM is faulty: ■ Disconnect and reconnect the cabinet ■ If the problem remains, contact your supplier
Backup Prob	The backup was not successful (your latest modifications have not been saved): ■ Repeat the modifications and the backup ■ If the problem remains, contact your supplier
Incompl. Fua	The positional feedback from FU A is incoherent: ■ Check the LV cabling from FU A ■ If the problem remains, contact your MV switchgear supplier
Incompl. Fub	The positional feedback from FU B is incoherent: ■ Check the LV cabling from FU B ■ If the problem remains, contact your MV switchgear supplier
Timeout Fua	The time taken to execute an operation on FU A is longer than normal: ■ Execute an operation on FU A ■ If the problem remains, check the cabling and maintenance of your MV switchgear or contact your MV switchgear supplier
Timeout Fub	The time taken to execute an operation on FU B is longer than normal: ■ Execute an operation on FU B ■ If the problem remains, check the cabling and maintenance of your MV switchgear or contact your MV switchgear supplier

Characteristics

- Auxiliary Power Supply: 230V ~
- Consumption:

<50 VA (batteries charged)
<80 VA (batteries not charged)
<15 VA (absence of aux. power)

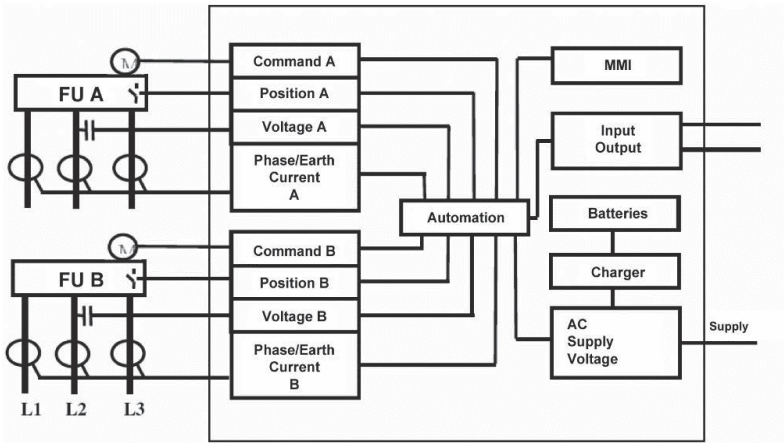
- 48 V motor control supply voltage =

Vertical and Horizontal RCX-ATS

- Temperature:
  - -15 to +55 °C when operating
  - -25 to +70 °C when stored
- Battery life:60 Open/Close operations for a Fluokit M24 type cubicle (Motor: 48 Vdc, 15 A-50 ms & 5 A-7s)
- Protection: IP2X
- Interface with the cubicle control mechanism (HAN, 10-pin connector):

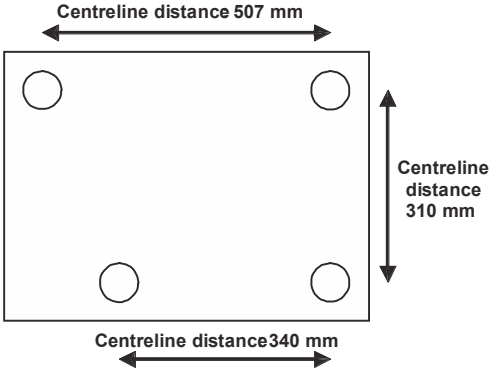
N°	Function
1	0 Vdc
2	Close command
3	Open command
4	Open
5	Closed
6	+48 Vdc
7	Control neutralized
8	Presence/Absence of MV
9	Reserved
10	Reserved

- General flow diagram



Vertical RCX-ATS

- Dimensions, without mountings: H 600 x W 298 x D 290 (mm)
- Dimensions, with mountings: H 650 x W 298 x D 310 (mm)
- Weight: Approx. 33 kg
- Wall mounting: Using 4 x 10 mm diameter bolts or studs at a horizontal centre-to-centre distance of 250 mm and a vertical centre-to-centre distance of 631 mm.
- Adapter used to attach the cabinet using an horizontal centre-to-centre distance of 560 mm



Horizontal RCX-ATS

- Dimensions: H 285 x W 565 x D 395 (mm)
- Weight: Approx. 33 kg
- Cubicle mounting: Using the 4 x 10 mm diameter holes in the lower surface of the cabinet.

Fuses

- Auxiliary Power Supply:
  - Fuse 10 x 38
  - The fuse rating is given on the label alongside the fuse holder: 2A gG
- Batteries:
  - 2 identical 5 x 20 fuses
  - The fuse rating is given on the battery cables: 8A TT 125V
- Electronic Control Unit:
  - Re-arming fuse (RESET button)

Remote Signaling assignment table

Each remote signal and external indicator light can be assigned to one or more of the following pieces of information:

- Ammetric fault – Line A
- Ammetric fault – Line B
- Absence MV-A (Yes/No)
- Absence MV-B (Yes/No)
- Pre-alarm A (Yes/No)
- Pre-alarm B (Yes/No)
- NC A (Yes/No)
- NC B (Yes/No)
- Local (Yes/No)
- Auto. U/S (Yes/No)
- Ext. Lock (Yes/No)
- Cycle running (Yes/No)
- No 230V AEI (Yes/No)
- No 230V AEI (Yes/No)
- No 48 V (Yes/No)

Menu structure

Level 1	Level 2	Level 3	Factory preset	Min. Max. or list of options	Units
Consultation	Faulty Equipment			Fee Faulty Equipment table	
	Meter	Phase Fault FU A		No. of phase faults on FU A	
		Phase Nr Fault FU A		No. of near phase faults on FU A	
		Earth Fault FU A		No. of earth faults on FU A	
		Earth Nr Fault FU A		No. of earth near faults on FU A	
		Manoeuvres FU A		No. of manoeuvres on FU A	
		Nr-Alarm FU A		No. of near alarms on FU A	
		Phase Fault FU B		No. of phase faults on FU B	
		Phase Nr Fault FU B		No. of near phase faults on FU B	
		Earth Fault FU B		No. of earth faults on FU B	
		Earth Nr Fault FU B		No. of earth near faults on FU B	
		Manoeuvres FU B		No. of manoeuvres on FU B	
		Nr-Alarm FU B		No. of near alarms on FU B	
	Readings	Int. Power Volt.		General voltage	V
		Temperature		Cabinet temperature	°C
		Batt. AE 1		AE1 battery voltage	V
		Batt. AE 2		AE2 battery voltage (redundant option)	V
Test Reset	Lamp Test			Testing lights and outputs	
	Reset			Resets all counters	
	Test AFD A			Test detector – FU A	
	Test AFD B			Test detector – FU B	
Std Setting	Max No. Abandons		3	0 (inactive) 3 4 or 5	attempts
	Switch Over	A to B	Yes	Yes / No	
		B to A	Yes	Yes / No	
		No Confirm A + B	No	Yes / No	In parallel
		No Supply Surge	No	Yes / No	In parallel
	Auto. Delay Funct.		No	Yes / No	
	Fault Duration		300	From 40 to 1000 in steps of 20	ms
	Phase Threshold		450	From I00 to 650 in steps of 50	A
	Earth Threshold		40	From 20 to 160 in steps of 5	A
Settings	Telesig Assign	Conf Ext Indic I	Yes Yes No No No No No No No No No No No No No	Fault Amp A (Yes/No) Fault Amp B (Yes/No) Absence MV A (Yes/No) Absence MV B (Yes/No) Pre Alarm A (Yes/No) Pre Alarm B (Yes/No) NC A (Yes/No) NC B (Yes/No) Local (Yes/No) Automation off (Yes/No) Ext. lock (Yes/No) Automat. running (Yes/No) No 230V AE1 (Yes/No) No 230V AE2 (Yes/No) No 48V (Yes/No)	
		Conf Ext Indic 2		Idem	
		Conf Rem Mon 1		Idem	
		Conf Rem Mon 2		Idem	
		Conf Rem Mon 3		Idem	
		Conf Rem Mon 4		Idem	
		Conf Rem Mon 5		Idem	

Menu structure (contd.)

Level I	Level 2	Level 3	Factory preset	Min. Max. or list of options	Units
	Pre. Man Time A		10	1,2,3,4,5 ,10,20,30,40,50,60	S
	Pre. Man Time B		10	1,2,3,4,5 ,10,20,30,40,50,60	S
	Add. Delay		1000	50,100,200,500,1000,2000,30000, 4000,50000	ms
	Pulse Dur Rem A		2500	From 500 to 5000 in steps of 500	ms
	Pulse Dur Rem B		2500	From 500 to 5000 in steps of 500	ms
	Max Surv Time A		30	1,2,3,4,5,10,20,30,40,50,60	S
	Max Surv Time B		30	1,2,3,4,5,10,20,30,40,50,60	S
	Auto Time Delay		5	1,2,3,4,5,10,20,30,40,50,60	S
	Nor Time Delay		30	30,35,40,45,50,55,60	S
	Near Fault T/Out		40	From 40 to 1000 in steps of 20	ms
	Timeout Reset		2	0,1,2,3,4,8,16,32,96	H
	Inrush Timing		0	0(inactive),100,200,300,400,500,600 ,700,800,900,1000,1500, 2000,3000.	ms
	Ivd Threshold		4	0,1,2,3,4,5,6,7	
	General Info	Sel. Switch Option	No	Norm A Backup B Yes / No	
		Sel. Switch Option	No	Norm B Backup A Yes / No	
		Grouped Reset/ Setting AFD	Yes	Regroup Rst Yes / No	
		Afd Setting / Line A Indep	No	LINE A INDEP Yes / No	
		Afd Setting / Line B Indep	No	Line B Indep Yes / No	
		Ic onfig	No No Yes	8 (Yes/No) 16 (Yes/No) 8+8 (Yes/No)	h
		AE2 Option	No	Yes / No	
		Setting IVD	No No	A integrated (Yes/No) B integrated (Yes/No)	
		Ext Ind 1 Flashing	Yes	Ext Ind 1 Flashing Yes / No	
		Ext Ind 2 Flashing	Yes	Ext Ind 2 Flashing Yes / No	

Glossary

AE	Power supply
MMI	Man-machine Interface
ATS	Automatic Transfer Switchover
LED	Light Emitting Diode
LCD	Liquid Crystal Display
MV	Medium Voltage
PS	Source Selection
RCX	Remote Control X
TC	Remote Order (Télécommande)
TCD	Double Remote Order (Télécommande Double)
TS	Remote-signaling (TéléSignalisation)
FU	Functional Unit (or cubicle)
NC	Load-break & disconnector switch
IVD	MV voltage detector
VEXT	External Light Indicator
N/B	Normal/Backup
AFD	Ammetric Fault Detector
RPTI	Voltage presence indicator relay
Remote Mode	= Controlled remotely

Notes

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